

REMARKS

Summary

This Amendment is responsive to the Office Action mailed on February 3, 2004. Claim 13 is amended. Claims 16-26 and 28-30 are cancelled. Claims 31-47 are new. Claims 1-15, 27, and 31-47 are pending.

Claims 16 and 28 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Sakazawa (US 5,550,590).

Claims 1, 16-18, and 27-30 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Peterson (US 5,986,712).

Claims 16-18 and 28-30 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Hurst (US 5,731,837).

Claims 1-12 and 16-30 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Borgwardt (US 5,949,490).

Claims 13-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Borgwardt in view of Ben-Arie (US 5,946,039).

Applicants respectfully traverse these rejections in view of the amended claims and the comments which follow.

Discussion of Amended Claims

Claim 13 is amended to clarify that the calculation of the reference quantizer scale is also based on the target quantization level.

Claims 16-26 and 28-30 are cancelled. Claims 31-47 are new.

The subject matter of new claims 31-34 is disclosed at page 18, line 1 through page 24, line 8. The subject matter of new claims 35-37 is disclosed on page 24, line 9 through page 27, line 3. The subject matter of new claims 39-41 is disclosed on page 31, line 23 through page 35, line 23. The subject matter of new claim 42 is disclosed on page 36, line 17 through page 37, line 8. The subject matter of new claim 43 is disclosed on page

37, line 18 through page 38, line 2. The subject matter of new claims 45-47 is disclosed on page 41, line 1 through page 42, line 28.

No new matter has been added with the addition of the new claims.

#### Discussion of Peterson

Claims 1, 16-18, and 27-30 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Peterson. Claims 16-18 and 28-30 have been cancelled. The rejection of claims 1 and 27 in view of Peterson is respectfully traversed. An anticipation rejection requires that each and every element of the claimed invention as set forth in the claim be provided in the cited reference. See *Akamai Technologies Inc. v. Cable & Wireless Internet Services Inc.*, 68 USPQ2d 1186 (CA FC 2003), and cases cited therein. As discussed in detail below, Peterson does not meet the requirements for an anticipation rejection.

Peterson discloses a method for bit rate control wherein a current picture is partitioned into a plurality of partitions which are encoded by determining a total target number of encoded bits for the current picture to avoid overflow or underflow of a video verifier buffer (VBV) maintained by an encoder. The encoder determines a local target number of encoded bits for each partition of the current picture, in accordance with the total target number. A plurality of partition encoders are provided for encoding each partition, respectively, in accordance with the local target number for each partition. Each partition encoder maintains a local VBV having a local VBV fullness, to monitor local overflow or underflow conditions (Col. 2, lines 21-33).

Therefore, in Peterson, rate control is distributed among panels or partitions of a video frame (picture). A target bit rate is set for each partition. The partitions of the frame are processed independently, and the statistics among the partitions

are combined only once per frame.

With the present invention as set forth in claims 1 and 27 the first slice of each panel is encoded in accordance with the target quantization level. Subsequent slices in each panel are encoded with a quantization level that is allowed to vary from the target quantization level until the last slice of each panel is reached. The last slice of each panel is encoded using a quantization level that is driven toward the target quantization level. This process avoids visible artifacts caused by abrupt changes in quantizer scale at panel boundaries. As the quantization scale value used to encode the last slice of each panel is driven closer to the target quantization level used to encode the first slice of each panel, the panel boundary becomes less and less visible. The present invention provides an advantage over the system disclosed in Peterson, which does not address the problem of visible artifacts caused by abrupt changes in the quantizer scale at panel or partition boundaries.

The Examiner refers to reference numeral 310 of Figure 3 of Peterson as disclosing the driving of the quantization level used to encode the last slice of each partition to the target quantization level. Reference numeral 310 refers only to the fact that each stripe encoder adjusts its own local VBV. There is no reference to driving the quantization level for the last slice of a panel toward the target quantization level as claimed by Applicant.

Patterson does not disclose or remotely suggest Applicant's claimed features of encoding the first slice of each panel in accordance with the target quantization level, and driving the quantization level used to encode the last slice of each of the image panels toward the target quantization level used to encode the first slice of each panel, while allowing the quantization level used to encode slices of each panel between the first and last slice to vary from said target quantization level, as set

forth in Applicant's claims 1 and 27.

As Peterson does not disclose each and every element of the invention as claimed in claims 1 and 27, the rejections under 35 U.S.C. § 102(e) are believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

#### Discussion of Borgwardt

Claims 1-12 and 16-30 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Borgwardt. Claims 16-26 and 28-30 have been cancelled. The rejection of claims 1-12 and 27 in view of Borgwardt is respectfully traversed. An anticipation rejection requires that each and every element of the claimed invention as set forth in the claim be provided in the cited reference. See *Akamai Technologies Inc. v. Cable & Wireless Internet Services Inc.*, 68 USPQ2d 1186 (CA FC 2003), and cases cited therein. As discussed in detail below, Borgwardt does not meet the requirements for an anticipation rejection.

Borgwardt discloses a method for distributing video buffer rate control over a parallel compression architecture using a three pass algorithm for each picture within a group of pictures. The first pass parallel processors compute complexity measures for all the macroblocks in the entire picture so that a central rate controller knows them before encoding begins. In the second pass, the central rate controller divides up a target bit rate for the entire picture between slices of the picture to get an initial target bit rate for each slice based upon the complexities of the macroblocks. In a third pass, each slice is sent to a parallel processor for encoding (Col. 3, lines 3-14).

The Examiner has apparently equated the determination of rate for a current frame of Figure 6 of Borgwardt with Applicant's claimed determination of a quantization level for a vide frame (Office Action, page 5). Applicant respectfully

submits that the determination of a rate for a current frame does not imply the determination of a target quantization level for the frame as indicated by the Examiner.

Further, the method of Borgwardt treats each slice of the frame in the same manner. The step "Last Set of Slices" in Figure 6 of Borgwardt relied on by the Examiner merely indicates a check to determine if the slice processing loop should terminate. Borgwardt does not disclose that the last slice is treated differently than the other slices of the picture.

In contrast, with the present invention as set forth in claims 1 and 27, the first slice of each panel is encoded in accordance with the target quantization level. Subsequent slices in each panel are encoded with a quantization level that is allowed to vary from the target quantization level until the last slice of each panel is reached. The last slice of each panel is encoded using a quantization level that is driven toward the target quantization level. As discussed above in connection with Peterson, this process avoids visible artifacts caused by abrupt changes in quantizer scale at panel boundaries.

The "Abrupt Change" block of Figure 4 of Borgwardt refers to an abrupt change in the macroblock complexity, which is not equivalent to an abrupt change in quantizer scale. The present invention avoids an abrupt change in quantizer scale to prevent visible artifacts in the panel boundaries by driving the quantization level used to encode the last slice of each panel towards the target quantization level. An abrupt change in macroblock complexity does not affect the quality of the output video. Borgwardt detects an abrupt change in macroblock complexity only in order to adjust the target rate.

Accordingly, Borgwardt does not disclose the subject matter of claims 1-3, 6 and 27. In particular, Borgwardt does not disclose or remotely suggest encoding the first slice of each panel in accordance with the target quantization level, and

driving the quantization level used to encode the last slice of each of the image panels toward the target quantization level used to encode the first slice of each panel, while allowing the quantization level used to encode slices of each panel between the first and last slice to vary from said target quantization level, as set forth in Applicant's claims 1 and 27.

With regard to claims 4 and 5, the Examiner equates the MPEG/JPEG block of Figure 4 of Borgwardt with Applicant's adjustment of a GOP target bit rate based on a number of film or non-film pictures. There is no mention in Borgwardt of how to handle film verses non-film pictures or how to adjust a GOP target rate to account for film or non-film pictures. It is well known in the art that non-film pictures are normal video frames with a frame rate of 30 frames per second. Film pictures are video frames shot at 24 frames per second (i.e., movie films). To convert film pictures to normal (i.e., non-film) video, the 24 frames per second of movie film is converted to 30 frames per second by scanning every other frame with three fields instead of two. JPEG is an encoding process for still pictures and does not correspond to non-film mode as apparently assumed by the Examiner.

Therefore, Borgwardt does not disclose or remotely suggest the features of Applicant's claims 4 and 5.

The Examiner indicates that Figure 7 of Borgwardt discloses that a buffer level of the video encoder is used to control the start of a new GOP, as set forth in Applicant's claim 7 (Office Action, page 6). Figure 7 of Borgwardt shows a macroblock processing loop within a slice. Figure 7 of Borgwardt does not disclose or remotely suggest controlling the start a new group of pictures based on a buffer level.

The Examiner has also equated the "Storage" of Borgwardt's Figure 5 with the local storage of the compressed panel data of Applicant's claim 9. The Storage of Figure 5 of Borgwardt is

shown as being outside of the Client Processors and is therefore not local to each compression engine as in Applicant's claimed invention.

Further, while Borgwardt does describe updating the buffer fullness on a slice by slice basis (Bs), there is no mention in Borgwardt of how these bits are transferred from the buffer.

Applicant's claims 10 and 11 set forth methods for transferring this data from the buffer in the form of transport packets. This concept is not disclosed or suggested in Borgwardt.

As Borgwardt does not disclose each and every element of the invention as claimed in claims 1-12 and 27, the rejections under 35 U.S.C. § 102(e) are believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

Applicants respectfully submit that the present invention is not anticipated by and would not have been obvious to one skilled in the art in view of Peterson or Borgwardt, taken alone or in combination with any of the other prior art of record.

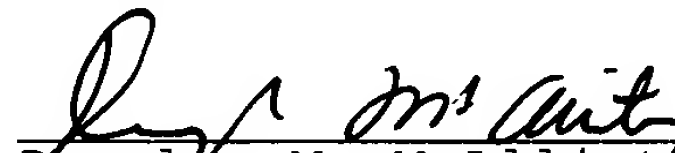
Withdrawal of the rejections under 35 U.S.C. § 102(b), 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a) is therefore respectfully requested.

Further remarks regarding the asserted relationship between Applicants' claims and the prior art are not deemed necessary, in view of the amended claims and the above discussion. Applicants' silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Conclusion

In view of the above, the Examiner is respectfully requested to reconsider this application, allow each of the presently pending claims, and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicants' undersigned attorney.

Respectfully submitted,



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